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Ec. of 444, there seems to have been a much larger eclipse.

Ec. of 382, July 3. While the tables do not indicate totality about this spot, they show a very large eclipse about seven in the morning. Also described as "Total, stars seen."

Ec. of 301, August 6. An eclipse on the Sun's north limb on the afternoon of this day, but the magnitude proves small.

Ec. of 188, July 17. Mentioned as total in China in the *Tung Keen Kang Muh*, and referred to also in Tycho Brahe's *Historia Celestis*, as having been seen at Rome, in these words: "Solis eclipsis anno Urbis C. 565, C. Livio Salviatore et Marco Valerio Messalo Coss. ⊙ inter tertiam et quartam diei horam Romæ defecit. Ex Livio, lib. 8, dec. 3."

Nearly total in latitude 33° N., longitude 118° E. Totality, according to these tables, passed a little north of this point, but owing to the small excess of the Moon's semidiameter over that of the Sun, the duration would be short. At Rome, the magnitude would also be very great, and nearly total, between 5^h and 6^h in the morning.

Ec. of 181, March 4. The Sun would be a crescent about $2\frac{1}{4}^h$ afternoon; being 11 digits eclipsed. Totality, a little to the north.

Upton Helions Rectory, Crediton.
1874, *November* 4.

On Certain Phenomena seen during Eclipses of the Sun, and their bearing on the question of a Lunar Atmosphere.

By John Brett.

The eclipse of the Sun of the 10th of October last was observed in the Island of Guernsey under tolerably favourable circumstances. The wind was from the south-west, and the view only occasionally interrupted by clouds. Definition remarkably steady.

At 10^h 15^m G. M. T. the limb of the Moon, towards the following cusp, presented a series of prominent mountains, amongst which was one particularly deep indentation or notch.

The phenomenon to which this paper refers occurred at the time this particular notch arrived at the cusp and passed off the Sun's disk.

It consisted of a minute ray or brush of light, proceeding from the cusp of the Sun, and intruding upon the Moon's limb; the appearance in this instance being exceedingly transient, and disappearing within two seconds of time.

The rapidity of the intrusion was equal to that of the Moon's motion, so that it may be more correctly described as light dragged away from the Sun's cusp than light projected upon the Moon's disk.

The cusp was, of course, blunted by the notch or lunar valley, and it was at this moment that the encroaching light advanced over the limb.

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The character of the ray might be called flickering and sparkling: an appearance such as might be caused by the successive illumination and obscuration of minute excrescences rapidly passing away from the parallel of the illuminating ray.

In estimating the extent to which the encroaching light advanced over the limb, the only available standard was the apparent depth of the lunar valley in which it occurred. I should say it advanced to a distance about equal to twice the height of the adjacent mountain from the bottom of the valley. From this rough estimate it will be seen that the phenomenon was exceedingly minute and subtle, and one which none but very practised observers would be likely to notice at all.

I, however, had the advantage of having seen a similar phenomenon before, under conditions which rendered it far more conspicuous; that is to say, in the eclipse of 1870, December 22, when the Moon was advancing over the Sun's disk instead of receding from it.

On that occasion a similar emanation proceeded from both cusps of the Sun at the same time, and these were seen with great steadiness and perfection of definition, although the time of their duration unfortunately could not be estimated, as they were only seen through a chasm in a passing cloud.

They were then of far greater length than in the recent eclipse: (vide *Monthly Notices*, 1871, March.) The telescope used on that occasion was a reflector of 8½-inches aperture, but in this instance the instrument was a refractor by Cooke, of only 3-inches aperture, but of a quality which probably cannot be surpassed. The power employed was 100, with first reflexion prism.

The interpretation of the above observations presents certain difficulties, particularly on account of the rays appearing only at the cusps; but I ask leave to express my own opinion upon it, as follows.

The encroaching light must be reflected from something. I assume that thing to be the Moon's surface.

But before the light could be so reflected, it is obvious that it must have been to some extent diverted from its originally straight course from the Sun to the spectator. To effect this, I assume the existence of a lunar atmosphere, refracting it sufficiently to cause it to impinge upon the more prominent of those excrescences which the perspective view of the spherical surface of the Moon necessarily makes to appear to crowd more and more thickly towards the profile or limb.

A very small density of the refracting medium would be sufficient for the purpose.

The spherical form of the Moon would of course account for the weakening of the light towards the end of the brush; and the receding motion for the sparkling character of it.

But there remains the question why the refracted light is not seen as a fringe of twilight bordering all that part of the Moon's

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limb projected upon the Sun's disk; and, until the recent eclipse, this difficulty seemed more abstruse than it is now.

The fact that the intruding ray was only seen on this occasion in one valley of the Moon, and that the deepest of those visible upon the limb, would appear to corroborate the hypothesis that all the Moon's atmosphere of appreciable density is to be found secluded in her deepest valleys.

There is, however, another circumstance not to be overlooked in this interpretation, and which, combined with the last consideration, leaves, I think, nothing further to be explained; viz., that the extent of lunar atmosphere traversed by the incident ray at the cusp subtends a greater visual angle than at any other point on the limb; so that, when a deep lunar valley does appear at that point, the effect of refraction is exhibited under the most favourable circumstances.

It will not surprise me if it can be shown that my theory is untenable; but as far as the observations go, I respectfully offer them for consideration as good observations, and such as may possibly throw some light on the question whether the Moon has any atmosphere or not.

38, *Harley Street, Cavendish Square.*
1874. *November* 10.

On the Inner Satellites of Uranus. By Prof. Edward S. Holden, U.S.N.

It is well known that Sir William Herschel suspected that the planet which he had discovered was accompanied by six Satellites.

These he numbered in their order, proceeding outwards from the planet:—

I	Period	5	days	21	hours
II	„	8	„	18	„
III	„	10	„	23	„
IV	„	13	„	11	„
V	„	38	„	01	„
VI	„	107	„	16	„

Of the existence of satellites II and IV there is no manner of doubt, since they were steadily observed by the elder Herschel from 1787, January 11, to 1810, May 25, and by his son in the years 1828 to 1832, as well as by Lamont, Struve, Lassell, and Newcomb since that time, and all of these observations have been consistent.

Satellites I, III, V, and VI have no such evidence in favour of their existence as the brighter ones II and IV.